

Fan Duct Heat Exchanger for Turbine Cooling Air, Phase I

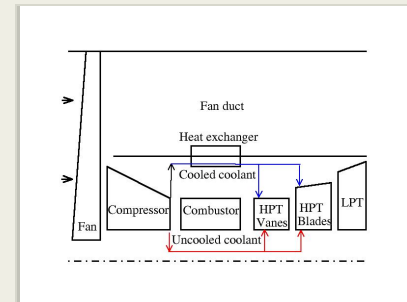
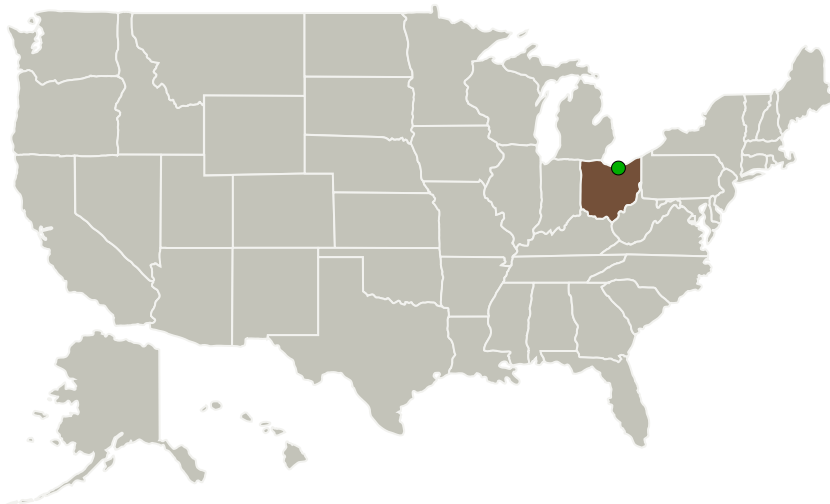
Completed Technology Project (2016 - 2016)



Project Introduction

The proposal is for the design of a fan duct heat exchanger in order to improve aircraft fuel burn. The fan duct heat exchanger decreases the temperature of the 15% to 20% of compressor discharge air used to cool the High Pressure Turbine (HPT). Reducing the HPT cooling air temperature reduces the amount of cooling air needed for HPT cooling, and reducing vane and rotor blade cooling improves engine Specific Fuel Consumption (SFC). Fuel burn is adversely affected by any added engine weight due to the heat exchanger. Fan duct air is much colder than compressor discharge air, and can be used as a cold sink for cooling the HPT cooling air. Parametric analyses will be done to determine the SFC reduction as a function of cooling air temperature decrease. Pressure losses for both sides of the heat exchanger will be part of the analyses. The fan duct heat exchanger has large pressure differentials between the high pressure compressor discharge air and the relatively low pressure fan duct air. Structural analyses will be done for the heat exchanger to determine heat exchanger weight.

Primary U.S. Work Locations and Key Partners



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Organizations Performing Work	Role	Type	Location
N&R Engineering	Lead Organization	Industry Small Disadvantaged Business (SDB)	Parma Heights, Ohio
● Glenn Research Center(GRC)	Supporting Organization	NASA Center	Cleveland, Ohio

Primary U.S. Work Locations

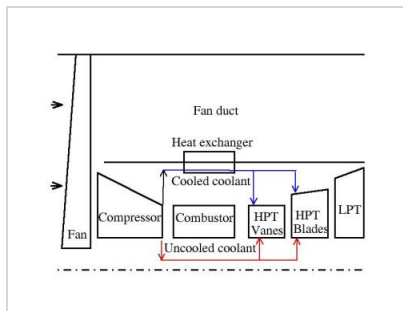
Ohio

Project Transitions

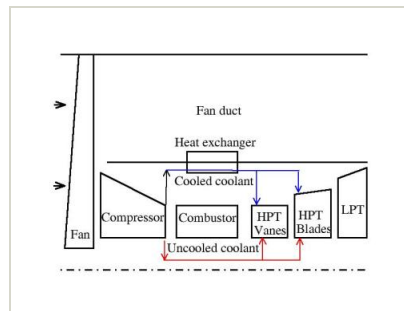
**June 2016:** Project Start**December 2016:** Closed out**Closeout Documentation:**

- Final Summary Chart(<https://techport.nasa.gov/file/139740>)

Images

**Briefing Chart Image**

Fan Duct Heat Exchanger for Turbine Cooling Air, Phase I
(<https://techport.nasa.gov/image/132664>)

**Final Summary Chart Image**

Fan Duct Heat Exchanger for Turbine Cooling Air, Phase I Project Image
(<https://techport.nasa.gov/image/135003>)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

N&R Engineering

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

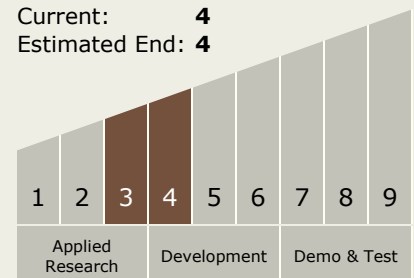
Program Manager:

Carlos Torrez

Principal Investigator:

Robert J Boyle

Technology Maturity (TRL)

Start: **3**Current: **4**Estimated End: **4**

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Technology Areas

Primary:

- TX01 Propulsion Systems
 - └ TX01.3 Aero Propulsion
 - └ TX01.3.1 Integrated Systems and Ancillary Technologies

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System